

Headquarters U.S. Air Force

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Annual SERC Research Review

***AF Sponsored SERC Study
Expedited Systems Engineering***



5 Oct 2011

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Bottom Line Up Front

“Increasingly urgent demands of the warfighter are requiring effective capabilities to be fielded more rapidly than the conventional acquisition processes and development methodologies allow”

***--NDIA Systems Engineering Division, Task Group Report
Top Systems Engineering Issues in US Defense Industry, Sep 2010***

- **Framing today’s acquisition environment**
- **Increase/Rewrite in guidance and policy**
- **AF Systems Engineering Strategic Plan provides roadmap**
- **Explore and develop a scalable Expedited SE framework**
 - **Rapid acquisition + Sustainable + Reliable + Adaptable**
- **2nd order affect - Expedited SE could streamline traditional SE**



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The Problem – Framing Today's Environment



Numerous studies and reports document program performance issues and the role of effective systems engineering

ETC...

GAO

For Release on Delivery
Expected at 1:30 p.m. EST
February 11, 2009

United States Government Accountability Office

Testimony
Before the Subcommittee on Defense,
Committee on Appropriations, House of
Representatives

DEFENSE MANAGEMENT

Actions Needed to
Overcome Long-standing
Challenges with Weapon
Systems Acquisition and
Service Contract
Management

Statement of Gene L. Dodaro
Acting Comptroller General of the United States



GAO-09-362T

“...programs continue to take longer to develop, cost more, and deliver fewer quantities and capabilities than originally planned.”

“costs ... increased 26 percent and development costs increased by 40 percent from first estimates” and “... experienced, on average a 24 month delay delivering initial capabilities to warfighter”

“programs ... failed to deliver capabilities when promised—often forcing warfighters to spend additional funds on maintaining legacy systems”

■ In the 5+ years from 2003-2008 *:

- Only 1 non-ship pre-MDAP has gone to a MS A
- 20 MDAPs have gone through a MS B
- 14 MDAPs had had Nunn-McCurdy breaches

*Data from OSD Program Support Reviews

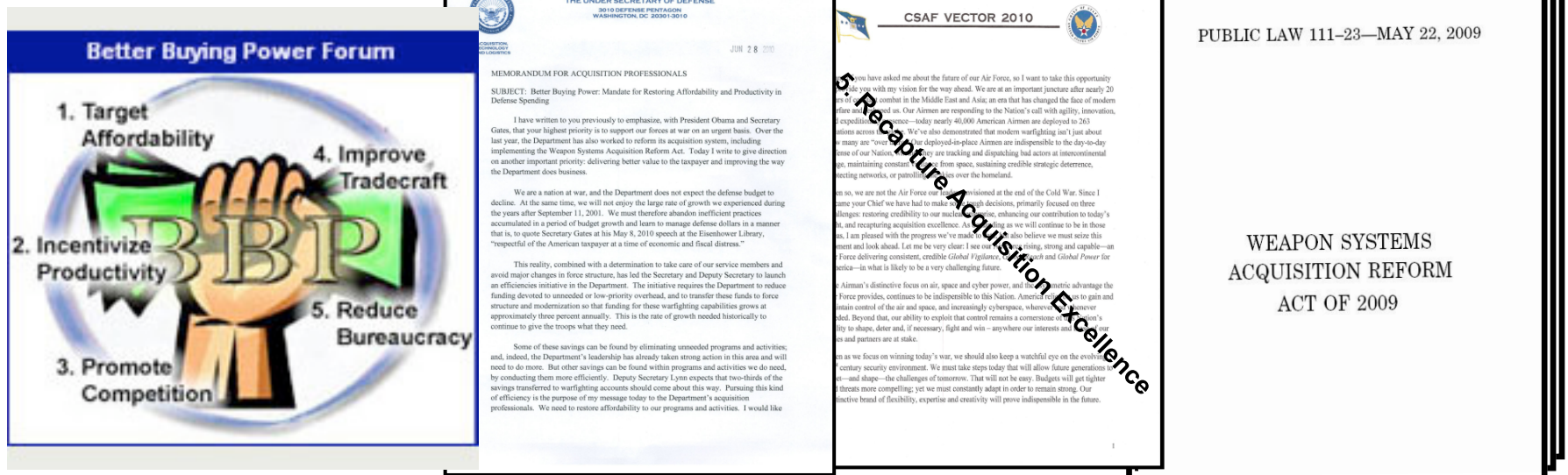
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The Result – DoD/Air Force Guidance, Policy, and Plans

- **Air Force Acquisition Improvement Plan (AIP), 4 May 2009**
- **Weapon Systems Acquisition Reform Act (WSARA), 22 May 2009**
- **CSAF's Vector, 4 July 2010**
- **OUSD(AT&L) "Better Buying Power" Memorandum, 14 Sep 2010, and implementation directive 3 Nov 2010**





OSD Policy, Directives and Memorandums

QDR, Strategies and AF Vectors

Informing the AF SE Strategy and Goals

AF S&T Workforce Roadmap

Reports and Studies

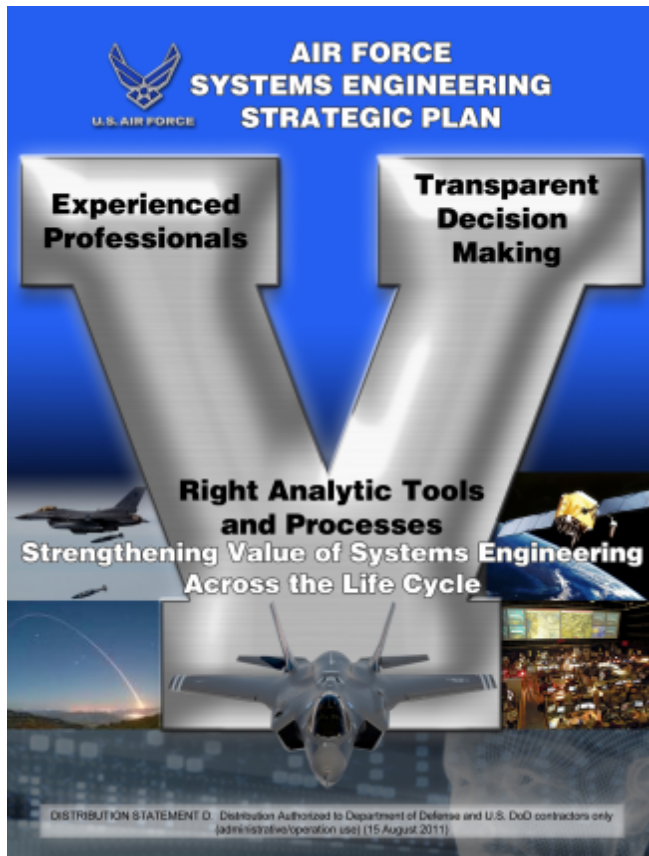




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AF SE Strategic Plan

Goal 5 – Expedited SE



AF SE Strategic Plan Goals

1	Manage workforce to achieve vision—provide requirements to STEMAC / SEAC and align to support Bright Horizons: Air Force STEM Workforce Strategic Roadmap
2	Drive efficiency through tailored/flexible standardization of policy, processes, practices, tools, training and metrics
3	Monitor and track program technical performance
4	Integrate sustainment considerations throughout the life cycle
5	Characterize an expedited, tailored SE process for urgent needs, rapid fielding, and technology insertion
6	Codify technical responsibility, accountability, and authority in decision-making process
7	Ensure early identification and management of technology, engineering and manufacturing risks and that those risks are characterized for decision makers at program reviews prior to commitment of resources
8	Collaboration and Communication: Improve collaboration with other functional organizations and stakeholders to improve mutual understanding, ownership, and acceptance

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“Urgent” Needed...But

- **Stakeholders and research point to “Urgent” the new “Normal”**
 - More than 20 rapid-reaction programs and organizations addressing DOD urgent warfighter needs, with over \$50 billion spent on urgent needs between 2005-2009

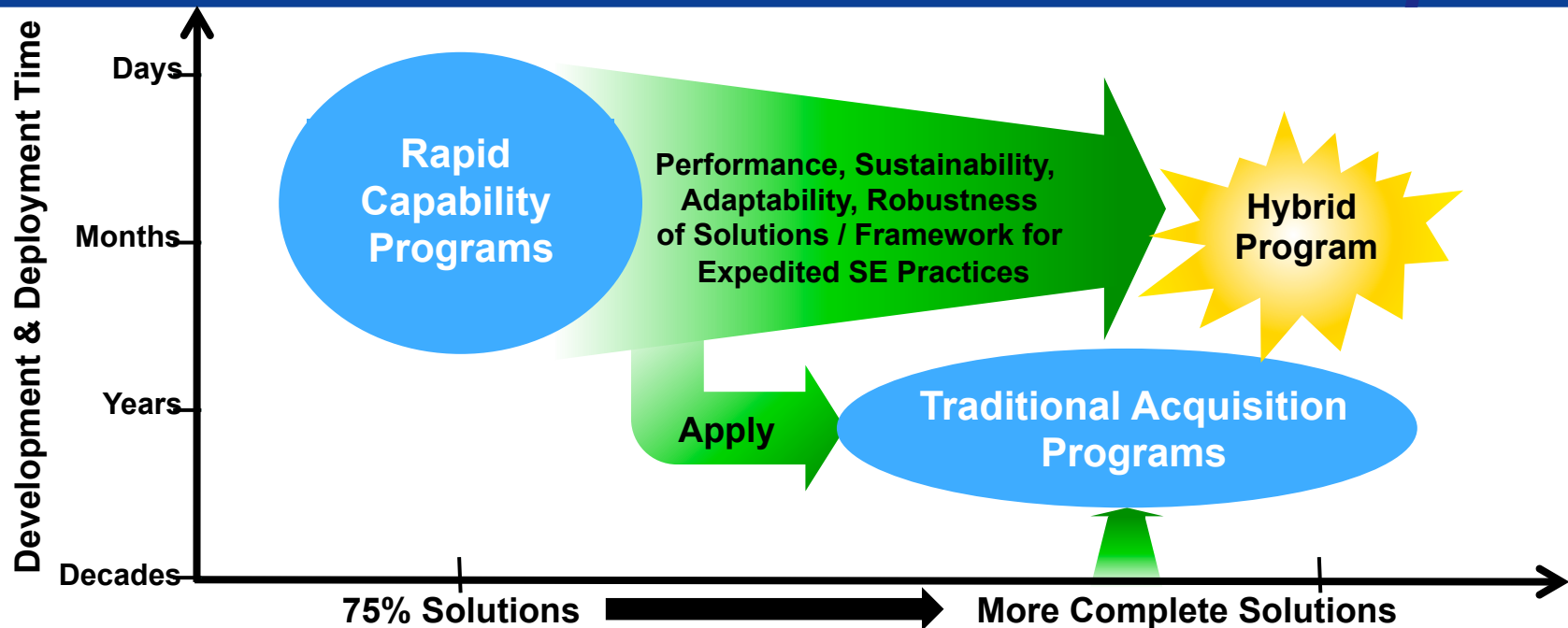
Research/Report	
<i>DOD’s Urgent Needs Processes Need a More Comprehensive Approach and Evaluation for Potential Consolidation</i>	GAO, March 2011
<i>Improvements to DOD’s Urgent Needs Processes Would Enhance Oversight and Expedite Efforts to Meet Critical Warfighter Needs</i>	GAO, April 2010
<i>Rapid Capability Fielding Toolbox Study: Standard acquisition process not designed to respond to dynamic environments</i>	DDR&E, March 2010
<i>Fulfillment of Urgent Operational Needs</i>	Defense Science Board Task Force, July 2009

I n t e g r i t y - S e r v i c e - E x c e l l e n c e



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Expedited SE Research Purpose



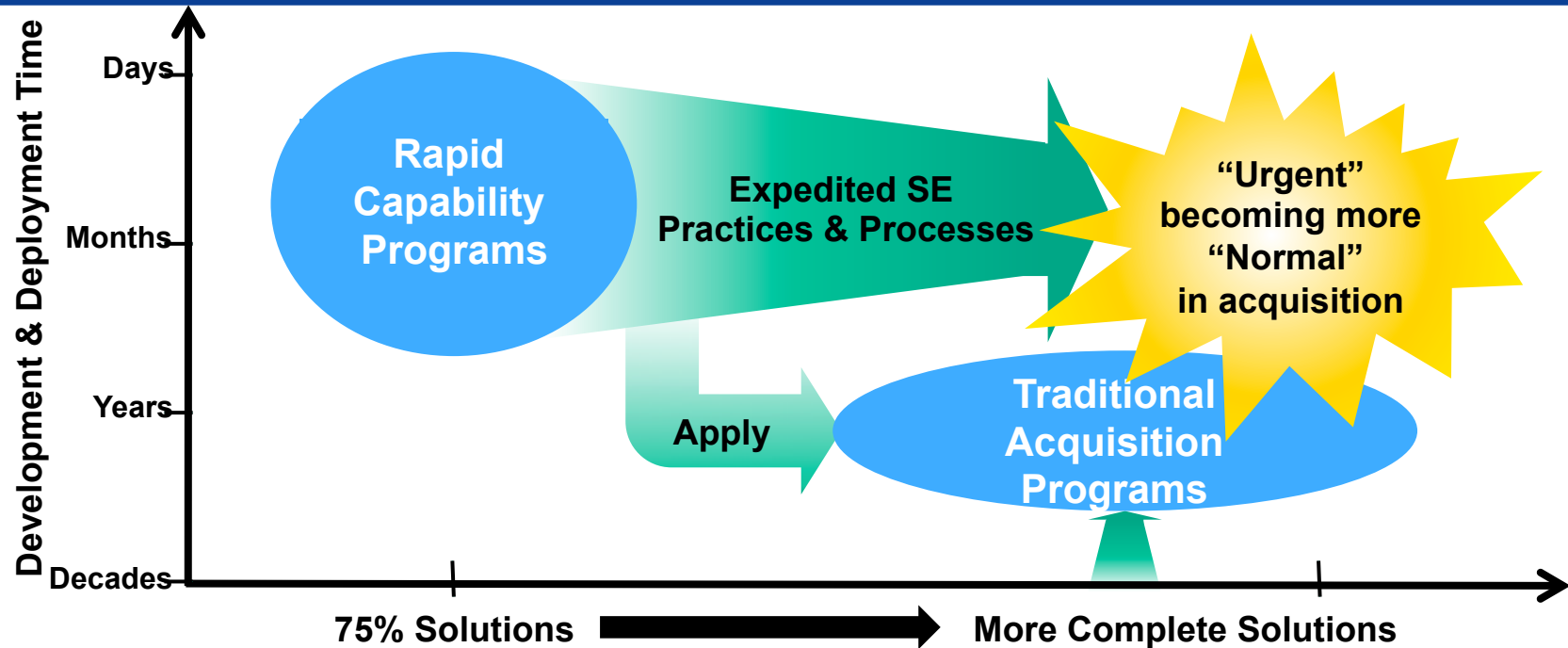
- **Explore/develop scalable expedited SE framework for hybrid pgms**
 - i.e., utilize rapid acquisition procurement but w/intent of more traditional lifecycle for deployment, maintainability, reliability, adaptability and sustainment.
- **Framework will examine scaling of SE activities in response to different development constraints...e.g., reduced development time.**

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2nd Order Effects of Expedited SE



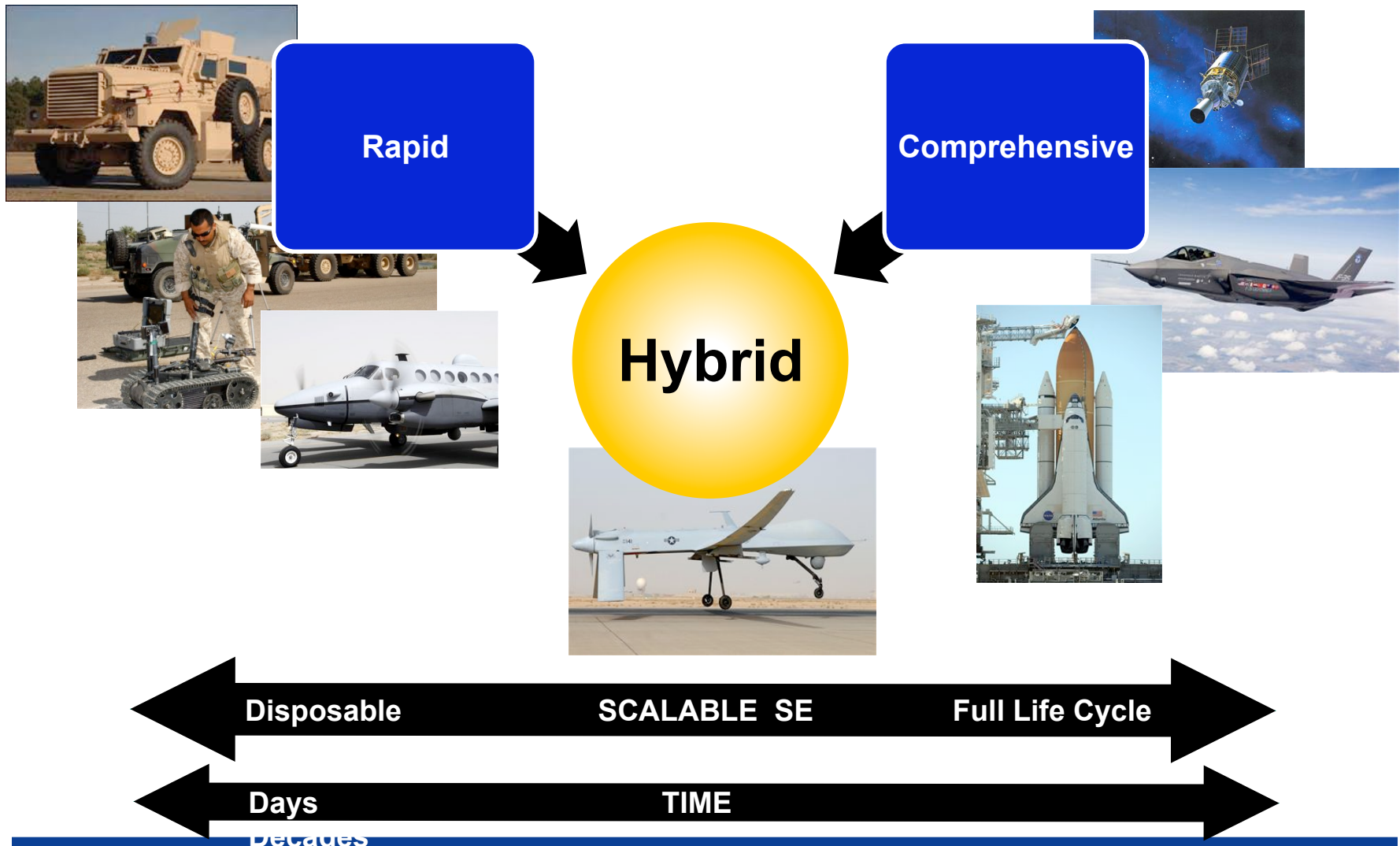
- **Streamline traditional SE practices / processes**
 - Expedited SE supports lean/agile processes + life cycle concepts
- **Cyber Battlefield must rapidly invent, develop and field new technologies**
 - AF Cyber Safari – recognizes speed-to-need (timelines more rapid – < 2 yrs)
- **Assist small / mediums-scale businesses- increase competition / innovation**

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Scalable Decision Making



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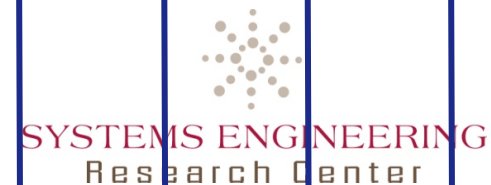
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Expedited SE

SERC Research Topic #34

- **Collaboration - SERC Universities, SERC Research Council, Air Force Center for Systems Engineering, and SAF/AQRE**
 - Principal Investigator (PI)= Stevens, Co-PI = Air Force Institute of Technology
- **Leverage previous SERC research and models, processes and tools**
- **Leverage AFIT research in SE – master level research projects**
- **Synergism with Systems 2020/Engineered Resilient Systems and Rapid Capabilities Toolbox**
- **Initial AF investment can lead to further DoD collaboration in SE**

	Sept 11	Oct 11	Nov 11	Dec 11	Jan 12	Feb 12	Mar 12	Apr 12	May 12
Phase 1									
Research/er Identification	△	△							
Aerospace Concept Design Center	△								
Northrop Grumman Futures Lab /	△								
Applied Minds		△							
PIF		△							
USSOCOM		△							
Phase 2		△							△
Phase 3							△		△



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Research Phases

SERC Research Topic #34

■ Phase 1: (Short Planning Phase)

- Identify organizations practicing expedited systems engineering
- Visit selected organizations
- Incorporate input from the SERC Research Council

■ Phase 2: (Analyze and Develop)

- Analyze current state of the art in Expedited SE w/in DoD + commercial sector
- Develop framework for scaling SE activities in response to different development constraints...such as reduced development time.

■ Phase 3: (Pathfinder Plan Development)

- Prepare a plan for validating framework on a DOD acquisition program.

■ Phase 4 (Future, Separate Funding):

- Execute Phase 3 Plan
- Conduct research to analyze the framework in action...iterate the framework based on observations and results as applied to a real program.

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Timeliness of Research

“...what we have determined will be a more streamlined management process going forward, where we are using the Rapid Capabilities Office (RCO) to help manage this project”

--Air Force Secretary , Michael Donley speaking on the Next Generation Bomber

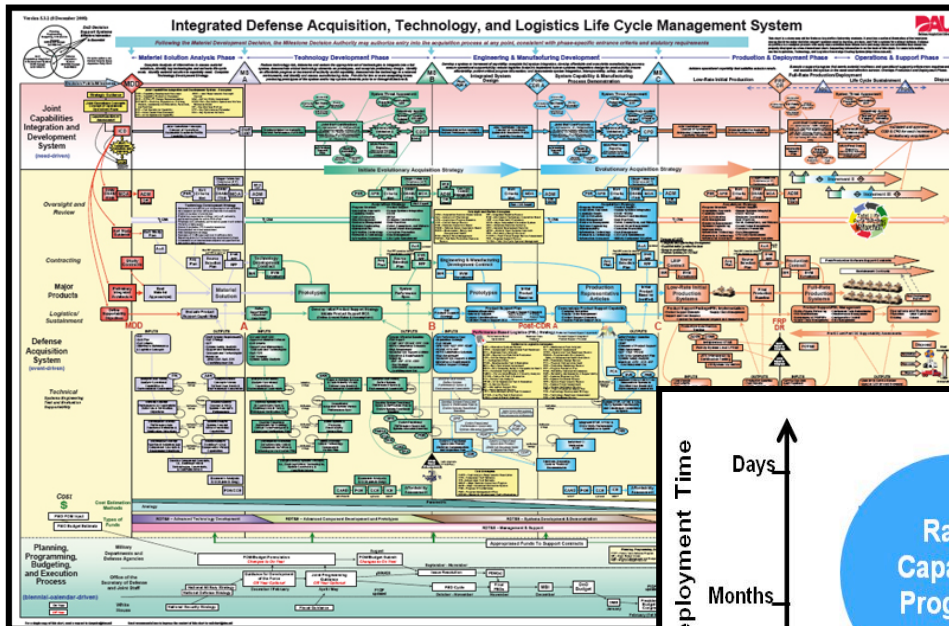
- **Resourced constrained environment + recapitalization of platforms may require developing new acquisition paradigms**
- **Acquisition processes need to become more agile to stay abreast of threat and leverage innovation**
- **As “urgent” becomes more “normal,” move from risk-adverse to managed-risk....purview of Systems Engineering**
- **Many studies point to the acquisition process...but few focus on role of SE ...what is done in an urgent needs environment and how those practices can be applied to longer lifecycle programs**



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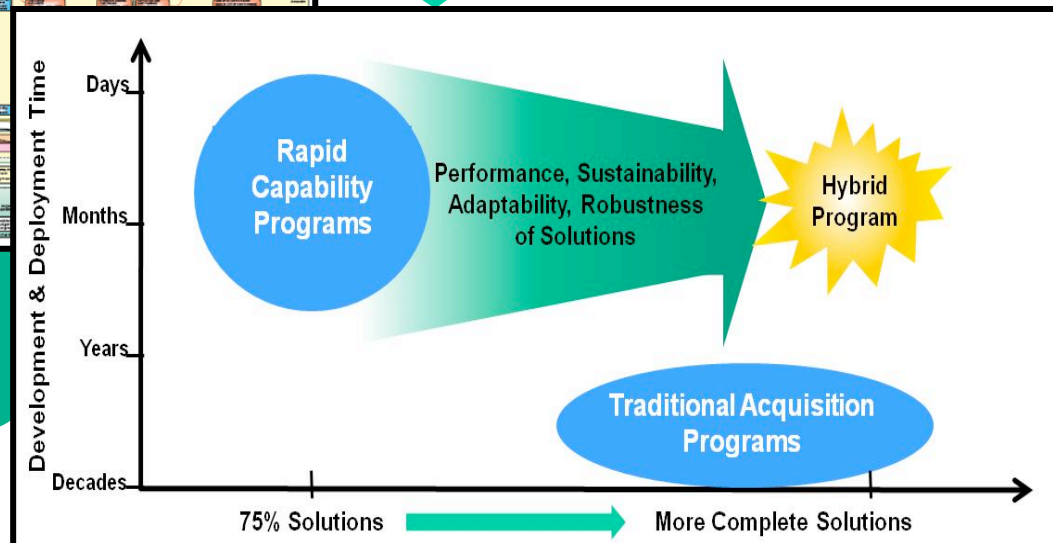
Rethinking How We Do SE?

Expedited SE SERC Study



Can we increase the rigor of our rapid process?

Can we increase the speed of our rigorous processes?



Shorten the time to deliver war-winning technologies – without compromising product integrity

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